

# SPATIAL AND TEMPORAL FLUCTUATIONS IN THE POPULATION OF COMMON MYNA *ACRIDOTHERES TRISTIS* (LINNAEUS) IN AND AROUND AN INDIAN CITY<sup>1</sup>

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(With three text-figures)

The common (Indian) myna *Acridotheres tristis* (Linnaeus) is a familiar bird in urban areas distributed over the entire Indian subcontinent. The monthly collection of data on its population ecology was carried out at Pune (Maharashtra) from June 1973 to August 1976. Three well marked seasons were observed in its annual cycle – the pre-breeding, the breeding and the post-breeding seasons. Monthly and seasonal changes were noticed in its population size. The dispersal of its population among different communal roosts also showed regular seasonal and yearly fluctuations. The population density of mynas during daytime changed according to seasons and habitats.

## INTRODUCTION

The common myna (also called Indian myna) *Acridotheres tristis* (Linnaeus) is a familiar bird in urban areas distributed over the entire Indian subcontinent. It occurs in plains and in wooded and cultivated areas. It is omnivorous. In all the seasons, it roosts communally at night. Though the common myna has been associated with man for many centuries, there is very little information on various aspects of its population structure. A few observations on number, flock size and roosting behaviour of the mynas have been reported by Coleman (1945), Hindwood (1948), Wilson (1973), Counsilman (1974), Feare (1976) and Sengupta (1982).

The present paper deals with observations on the seasonal fluctuations in population, dispersal of population among roosts and population density of common myna at Pune (Maharashtra).

## MATERIAL AND METHODS

The studies on common myna were carried out at Pune (18°30'N and 73°53'E) and surrounding areas. Altogether 27 communal roosts of mynas within a radius of 24 km were located (Fig. 1) and censused. Of these, 19 communal roost (R-I to R-XIX in Fig. 1) were centrally located within a radius of 8 km. The remaining 8 roosts were situated in the surrounding areas.

**Population counts:** The 19 centrally located roosts were censused intensively once in each month from June 1973 to August 1976 and later in the representative months, August 1978 and February 1979. At these roosts, observations were recorded between 1645 and 1930 hrs on the number of birds (accompanied by their young ones, if any) arriving at every 5 minute interval. In addition to this, morning counts were made between 0500 and 0730 hrs fortnightly at two roosts R-III and R-IV for a fixed period from August 1975 to September 1976. The remaining 8 roosts were censused twice a year during 1974-1977 only for their population counts. Besides this, the arriving mynas were censused for ten days consecutively in the evenings at three roosts R-III, R-IV and R-I during October, November and December 1975 respectively.

During the census of mynas carried out in the evening, the number of young ones fledged during the season, was recorded separately at eight roosts R-I to R-VIII from June to December in 1974 and 1975. The young ones differ from the adults in their smaller size and in their faltering flight. Therefore, they can be identified in the flocks, though with some difficulty, until December. After December, the young ones cannot be distinguished in the population because of the increase in their body size.

**Population density:** The feeding areas of various roosts (Fig. 1) were marked by following the mynas in the morning and evening and also by observing their directional routes. Population density of mynas during day time was studied once a month at three different localities – Model Colony, Poona University Campus and Paud Road – from April 1974 to September 1975 (Fig. 1). The census was carried out by line transect method four times a day at each

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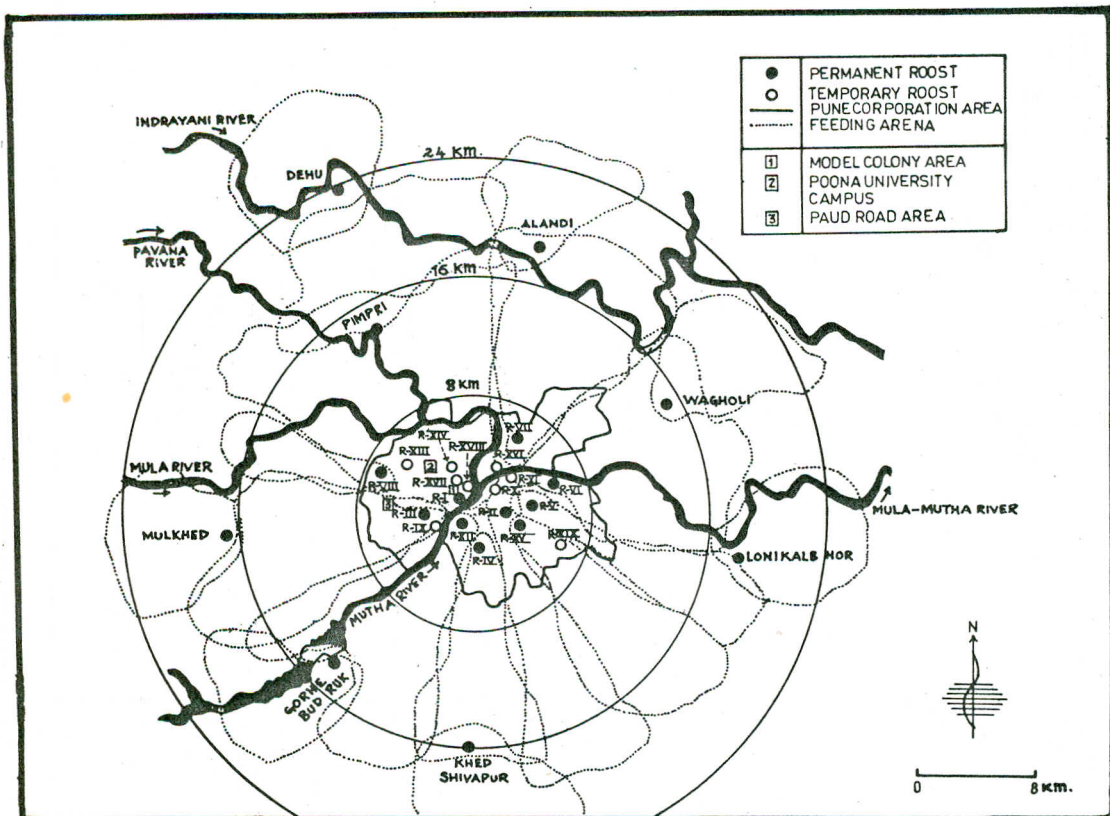


Fig. 1. Locations of communal roosts of common myna in and around Pune with their respective feeding areas.

R-I: Police Ground, R-II: St. Vincent, R-III: Film Institute, R-IV: Peshave Park, R-V: Race Course, R-VI: Koregaon Park, R-VII: Yerawada, R-VIII: Pashan, R-IX: Diwagi Metal Works, R-X: Pune Railway Station, R-XI: Bund Garden, R-XII: Valkunth, R-XIII: N.C.L., R-XIV: Agricultural College, R-XV: Cantonment Hospital, R-XVI: Deccan College, R-XVII: Sancheti Hospital, R-XVIII: Engineering College, R-XIX: Wanowori.

locality covering an area of approximately 1 sq km. Details of the localities are as follows: (1) Model Colony Area: The housing colony has number of bungalows with gardens around them. The whole area has substantial amount of greenery. (2) Poona University Campus: This area has residential quarters, buildings, garden, number of trees, *Acacia* shrubs, barren land and short grass patches. (3) Paud Road Area: The area consists of open land with short grass patches and some *Acacia* shrubs near residential quarters. Hardly any trees can be seen.

#### OBSERVATIONS AND RESULTS

After a period of rest, mynas slowly become active in the early morning by vocalizing and vacate the roost around the time of sunrise. They spend the

daytime in the feeding area in various activities. They start their return journey towards the communal roost in the evening, arrive at the roost around the time of sunset and vocalize loudly till they finally rest for the night. The birds were counted while they departed from the roost in the morning and while they arrived at the roost in the evening.

**Fluctuations in total population:** The total population of mynas in the city (considering all the 19 communal roosts) was observed to fluctuate monthly, seasonally and yearly.

Fig. 2 shows that there were two peaks, each followed by a trough in the number of mynas arriving at the roosts during every 12 month period from August to July. The highest peak in August and the lowest trough in June seem to be characteristic fea-

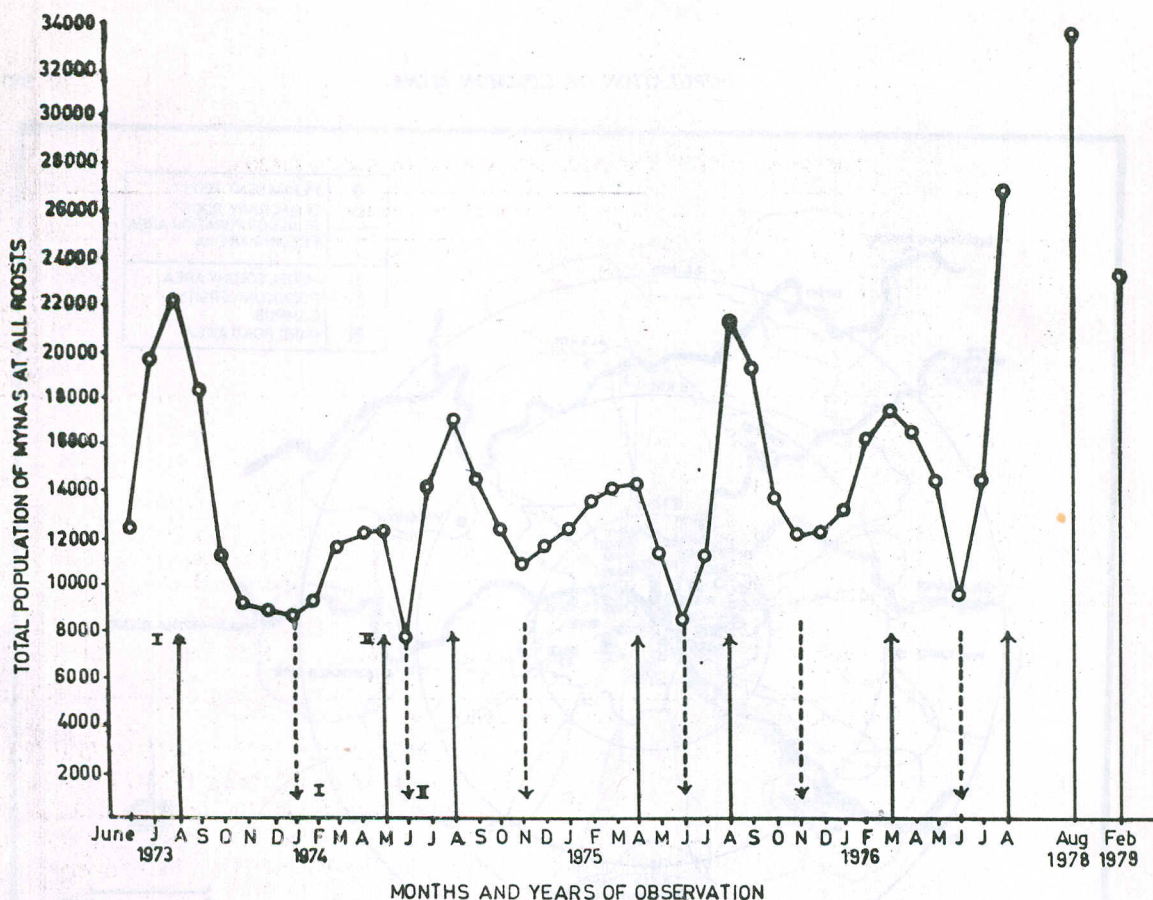


Fig.2. Monthly fluctuations in total number of common mynas arriving at 19 communal roosts.

tures for the number of birds at communal roosts. The timings of second peak and following trough, however, were variable. Another study undertaken for a period of 14 months in the mornings, when the number of birds leaving the roosts R-III and R-IV only were counted, revealed that the monthly fluctuations

TABLE 1  
SEASONAL CHANGES IN THE AVERAGE NUMBER OF COMMON MYNAS IN PUNE DURING 3 OBSERVATIONAL YEARS

Season	Average number of birds		
	1973-74	1974-75	1975-76
Post-breeding (Aug.-Oct.)	17296.7	14591.7	17977.7
Pre-breeding (Nov.-Mar.)	9625.2	12509.2	14189.6
Breeding (Apr.-July)	11637.0	11311.0	13679.5

in the roosting population estimated by the above two methods gave comparable results.

The following three phases were observed in the annual cycle of common myna – the pre-breeding season (November to March), the breeding season (April to July) and the post-breeding season (August to October). Changes in the average number of mynas during these three seasons showed that the post-breeding season had the highest population as compared to the remaining two seasons during all the years of observations (Table 1).

When population fluctuations were considered on yearly basis from August to July 1973-74, 1974-75 and 1975-76, it was observed that the mean population for these years was 12221.6, 12630.4 and 14966.6 respectively. This shows that there was an



TABLE 2  
ROOSTWISE DISPERSAL OF MYNA POPULATION IN DIFFERENT SEASONS

Season & Year	Average percentage of mynas at different roosts *										
	R-VI	R-VII	R-I	R-VIII	R-III	R-XII	R-IV	R-II	R-XV	R-V	R-IX to R-XI R-XIII R-XIV R-XVI to R-XIX
<b>1973-74</b>											
Post-breeding	2.8	4.5	45.5	4.1	10.7	3.0	2.5	22.2	0.0	2.7	2.0
Pre-breeding	3.6	7.0	45.4	4.8	9.4	3.5	3.2	16.7	0.0	3.6	2.8
Breeding	4.1	7.6	43.2	2.5	9.9	2.0	2.7	18.9	1.1	4.3	3.7
<b>1974-75</b>											
Post-breeding	5.3	8.2	30.5	3.0	18.1	1.8	4.7	16.6	1.4	6.3	4.1
Pre-breeding	9.6	7.8	39.4	2.8	9.5	2.0	5.1	13.0	1.5	6.0	3.3
Breeding	6.8	8.8	40.2	0.8	12.2	2.7	3.3	16.3	3.1	1.7	4.1
<b>1975-76</b>											
Post-breeding	6.8	7.5	32.3	0.03	15.6	4.9	5.4	18.0	4.3	1.6	3.57
Pre-breeding	8.9	8.8	37.9	3.1	7.2	6.5	5.0	12.5	5.7	2.1	2.3
Breeding	7.7	8.5	40.4	2.5	7.6	5.7	5.3	12.4	5.3	1.7	2.9

\* Roosts R-I to R-XIX have been arranged according to locations of feeding areas.

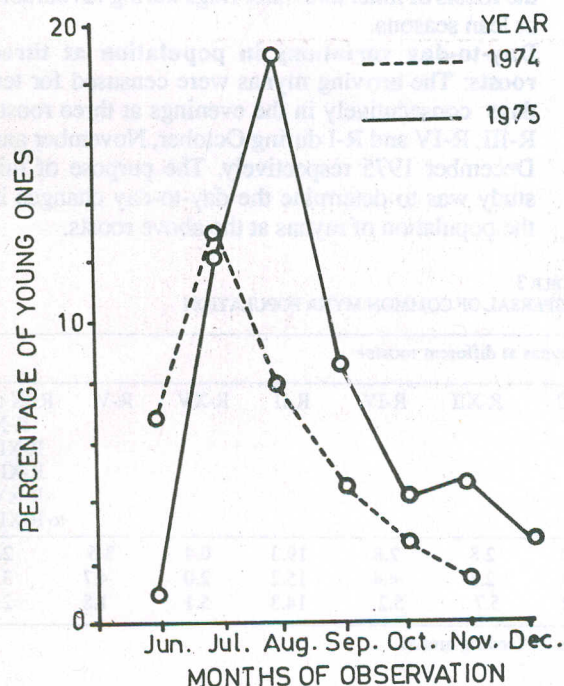


Fig. 3. Monthly mean percentage of young ones in the common myna population.

increase of 3.3% from 1973-74 to 1974-75 and a further increase of 15.6% from 1974-75 to 1975-76. Isolated observations during August 1978 and February 1979 indicated the possibility that there was a further increase in population of mynas during the intervening years 1976-77 and 1977-78 (Fig. 2).

The populaion counts of mynas at eight communal roosts of outer rings (Fig. 1) during 1974 to 1977 were as follows: Alandi 500-800, Wagholi 500-600, Loni-Kalbhor 500-600, Khed-Shivapur 500-700, Gorhe-Budruk 500-560, Mulkhed 300-400, Pimpri 600-800 and Dehu 500-700.

**Population of young ones:** The monthly mean percentage of young ones in the population was calculated and presented in Fig. 3. During the month of June, the number of young ones was found to be relatively less in the population. After this month, the number of young mynas increased in the population; during 1974, percentage of young ones was maximum in the month of July, whereas in 1975 it was maximum in the month of August. Thereafter, the number of young ones decreased and reached its lowest level in the months of November-December. After December, the young mynas could not be distinguished from adults in the population.

**Fluctuations in dispersal of population among different roosts:** The total population of the common mynas in the city area (inner ring of 8 km



radius) is dispersed among 19 communal roosts. Of these, only 10 roosts were found to be permanent and the remaining 9 roosts were temporary (Fig. 1). The permanent roosts were present throughout the period of study and had an average population over 300. Temporary roosts were abandoned frequently or totally at some time during the study period. As the populations at the temporary roosts were relatively small, they were considered together as a single unit in Table 2. The table indicates that the dispersal of population among various roosts was not uniform. There were one major roost (R-I) where more than 30% of the Pune birds roosted, two medium-sized roosts (R-II and R-III) where 10 to 30% roosted and a number of small-sized roosts (R-IV to R-XIX) where less than 10% roosted (Table 3). At these roosts, the populations seemed to undergo regular changes during different seasons and years (Table 2).

(1) The major roost R-I had a large feeding area and it overlapped those of the medium-sized (R-III) and small-sized (R-VII and R-VIII) roosts (Fig. 1). The relative percentage of population roosting at R-I decreased from breeding to post-breeding season and increased towards pre-breeding season during the year 1974-75 and 1975-76. Exactly reverse conditions were noticed at roost R-III more or less in the same ratio. As against these complementary changes, there was a small but parallel increase in population at roost R-I as well as R-III from pre-breeding to breeding season.

(2) Although rather small, some complementary changes in relative percentage of population were noticed at the medium-sized roost R-III and the

small-sized roost R-XII during most of the seasons (Table 2). The feeding areas of these two roosts again overlapped each other.

(3) The feeding area of the medium-sized roost R-II overlapped those of small-sized roosts R-IV, R-XV and to certain extent the area of the roost R-V (Fig. 1). The decrease or increase in the population at roost R-II had complementary effects mainly on the roost R-IV and to some extent on the roosts R-XV and R-V during all the seasons.

(4) In general, Table 3 indicates that the roost R-III showed an increase in population from 1973-74 to 1974-75 and then a decrease of about 3% towards 1975-76. On the other hand, at the roost R-XII showed a decrease in population from 1973-74 to 1974-75 and then an increase of about 3% towards 1975-76. The feeding areas of these above two roosts overlapped each other. Secondly, a steady increase in population was noticed at roosts R-XV and R-IV and a decrease at roosts R-VIII and R-II during all the three years of observation.

The feeding areas of communal roosts of the inner ring and those of the outer ring showed overlapping (Fig. 1). This indicates that exchange of myna population may also be taking place between the roosts of inner and outer rings during favourable or lean seasons.

**Day-to-day variations in population at three roosts:** The arriving mynas were censused for ten days consecutively in the evenings at three roosts R-III, R-IV and R-I during October, November and December 1975 respectively. The purpose of this study was to determine the day-to-day changes in the population of mynas at the above roosts.

TABLE 3  
YEARLY TRENDS IN THE ROOSTWISE DISPERSAL OF COMMON MYNA POPULATION

Average percentage of mynas at different roosts*											
Year	R-VI	R-VII	R-I	R-VIII	R-III	R-XII	R-IV	R-II	R-XV	R-V	R-IX to R-XI R-XIII R-XIV R-XVI to R-XIX
1973-74	3.5	6.4	44.7	3.8	10.0	2.8	2.8	19.3	0.4	3.5	2.8
1974-75	7.2	8.3	36.7	2.2	13.3	2.2	4.4	15.2	2.0	4.7	3.8
1975-76	7.8	8.3	36.9	1.9	10.1	5.7	5.2	14.3	5.1	1.8	2.9

\*Roosts R-I to R-XIX have been arranged according to locations of feeding arenas.



TABLE 4  
SEASONAL DIFFERENCES IN THE POPULATION DENSITY OF COMMON MYNAS DURING DAYTIME AT THREE DIFFERENT LOCALITIES DURING 1974-75

Season	Model colony area	Number of mynas per sq. km Poona University campus	Paud Road area
Breeding	26.4	33.9	26.4
Post-breeding	15.6	27.3	17.5
Pre-breeding	15.0	19.2	13.8
Mean	19.0	26.8	19.2

It was observed that there were day-to-day variations in the arriving population at each roost. The range of these changes on any two consecutive days was found to be between -9.6% and +6.9% at R-I (major roost), -6.3% and +17.1% at R-III (medium-sized roost) and -25.3% and +18.2% at R-IV (small-sized roost). These observations suggest that there was a local shift of mynas from roost to roost. Further, they also suggest that the magnitude of dispersal varied according to the size of the roost; the day-to-day variations in the population of mynas at a major roost R-I were the least, at a medium-sized roost R-III slightly more and at a small-sized roost R-IV still more.

**Population density:** Mynas from different communal roosts disperse into their feeding areas in the morning. They cover a roughly circular area of 1018 sq km with a radius of 18 km (Fig. 1). The mean population of mynas in Pune city, obtained from data collected over three years was about 13273 (see above). Therefore, the population density of mynas in the city area during daytime works out to about 13 birds per sq km irrespective of habitat and season.

In the evening, most of the mynas concentrate at the communal roosts located in the city area covering only about 138 sq km. This corresponds to a population density of 96.2 birds per sq km, which is 7.4 times the population density of feeding mynas during the daytime. Further, about 61% of the total population was restricted to roosts R-I, R-II, R-X, R-XII and R-XIV, which lie within a circular area of 2.3 km radius. This central area had thus the highest population density of 491.1 birds per sq km, which is 37.8 times the population density of the feeding mynas during daytime. This showed a very highly clumped distribution of mynas in the city area during night time.

A study was undertaken to assess the population density of mynas in the feeding area during daytime at three different localities in different

seasons. The average number of mynas were calculated at each locality during each season (Table 4). The table indicates that at each locality, the population density of mynas was highest in the breeding season followed by that in the post-breeding season. It was lowest in the pre-breeding season. The annual mean population density of mynas was higher at the Poona University campus than at the other two localities selected for this study.

#### DISCUSSION

Monthly changes in the population of mynas have shown similar trends during the three consecutive years of observation. A considerable increase was seen in the number of individuals in July-August, which seemed to be mainly due to the addition of juveniles to the population. A part of the increase may be due to the breeding females or one partner of the mated pairs who now returned to the roost after nesting. The decrease in number of mynas from August to September/October could be because of deaths of young ones due to disease or predators (young coming down on ground for feeding were sometimes attacked by domestic cats). Further fall in population from September/October to December could be explained as local migration outside the study area (emigration).

Towards the middle of the pre-breeding season (January onwards), there was a slow increase in the population till the beginning of the breeding season (April). This may be because of returning of mynas, which had emigrated outside the study area, to secure safer nesting sites before the commencement of the breeding season. The sudden drop in the roost populations from early to middle of the breeding season (April/May to June) could be related to the females or one partner of the mated pairs remaining at the nest for various nesting activities. Often, one partner of the mated pair was observed to be staying at the nest at night. Counsilman (1974) has also



made similar observations with Indian mynas at Auckland, New Zealand.

The yearly mean population of mynas in the study area was found to be increasing slowly during the period of observation. This was probably linked with the following ecological factors: the nesting, roosting and feeding habits of mynas. Mynas are camp followers of man. They roost communally in large numbers. The roost provides a relatively safe shelter at night. It is a fact that every year the human population in Pune city is increasing with a consequent expansion of residential quarters associated with trees and gardens. This in turn provides additional nesting sites and feeding areas for mynas and leads to an increase in their population.

Some fluctuations in the dispersal of myna population among different roosts have been observed every year. These could be due to seasonal changes in the quality and quantity of food in the feeding areas attached to the different roosts. The data reveal that, in spite of the above mentioned fluctuations, a definite minimum level of population was normally maintained at each roost and that a

major roost has relatively more stability of population size as compared to the medium and small-sized roosts.

The daytime population density of mynas at the three selected areas was higher during the breeding season, when the nesting activities were in full swing. In this season, the mynas lingered in the city area for selecting safer nest holes, for collecting suitable nesting material and searching for food for themselves and for their young. In the post-breeding and the pre-breeding seasons, there were no nesting activities. The search for better feeding localities may result in their moving outside the city area, thus decreasing the daytime population density in these seasons.

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#### REFERENCES

- COLEMAN, E. (1945): Flocking of Indian Mynas at Blackburn. *Vict. Nat. Melbourne* 62: 101-102.
- COUNSILMAN, J.J. (1974): Waking and roosting behaviour of the Indian Myna. *Emu* 74(3): 135-148.
- FEARE, C.J. (1976): Communal roosting in the Mynah, *Acridotheres tristis*. *J. Bombay nat. Hist. Soc.* 73(3): 525-527.
- HINDWOOD, K.A. (1948): A communal roost of the Indian Myna. *Emu* 47: 315-317.
- SENGUPTA, S. (1982): The Common Myna. S. Chand & Company Ltd; New Delhi, pp. 1-118.
- WILSON, P.R. (1973): The ecology of the Common Myna *Acridotheres tristis* L. in Hawke's Bay. Ph.D. Thesis. Victoria University, Wellington, New Zealand. Not referred to in original